Proceedings of the Iowa Academy of Science

Volume 6 | Annual Issue Article 8

1898

Preliminary Report on the Diatoms of Iowa

P. C. Myers

PRELIMINARY REPORT ON THE DIATOMS OF IOWA.

BY P. C. MYERS.

Within the last two years the author has often had occasion to congratulate himself for having acted on a suggestion from Prof. B. Shimek, of the State University of Iowa, to take up the study of a group of organisms which hitherto had, from the botanists of this state, received but scant attention.

The diatomaceæ constitute a group of microscopic organisms hovering near the place of meeting, if such there be, of plants and animals. Their closest affinities, however, seem to be with the plants.

Unicellular though they be, they make for themselves a glassy covering, whose two parts fit together as the top and bottom of a pill box. Chlorophyl is present, which, however, is masked by a brown coloring material called diatomin. Nearly all these little organisms have the power of movement; a graceful, gliding motion that reminds one of little steamboats.

Their study is connected with considerable difficulty, which probably accounts for their being neglected.

First.—They must be collected, a not o'er easy task.

Second.—They must be cleaned, in which not less than seven separate and distinct operations are necessary; some of these are boiling in nitric acid, immersion in potassium permanganate for three or four days, boiling in hydrochloric acid and a deal of washing.

Third.—They must be mounted, one at a time, on separate slides. As these little objects range in size from one-fiftieth of an inch, in the largest, to one-two-thousand-five-hundred-fortieth part of an inch in the smallest, it cannot be said to be heavy work; but it requires considerable concentration of the attention.

Fourth.—They must be identified. As the literature is badly scattered, one cannot hope to do much without several expensive sets of books and pamphlets. Even then there is a little

truth in the remark made by another botanist, with a sniff, that you might as well try to classify wall paper. The difficulty, however, is not greater than in other orders of equal size.

At first it might appear that the state of Iowa, with its monotonous rolling prairies would offer little diversity of aquatic plant life, but this has not proved to be the case. For present purposes the various localities where diatoms are found may be grouped in four divisions.

First.—Creeks and rivers, with the bogs and old river channels connected with them.

Second.—Springs, with the bogs and ditches watered by them.

Third.—The lakes found in that portion of the state covered by the Wisconsin drift.

Fourth.—Fossil deposits.

The first localities named, the creeks and rivers, were the first from which material was collected. Here abound the smaller naviculæ, synedræ, melosiræ, and most abundant of them all, the gomphonemæ, which may be seen as long, gelatinous streamers of a rich brown color, in moving water, or as a covering on the stones in rapids and cataracts. In the brooks and ditches the more fragile forms of nitzschia and synedra are found. Under favorable conditions these little organisms cover the bottom of the brooks and ditches to a depth sufficient to color everything a rich brown. When the sun shines on them the oxygen liberated raises them to the surface of the water and they are carried along until they strike a twig or board or other obstacle, where they may be seen at times an inch in depth and several square feet in extent.

East of Iowa City, about two and one-half miles, there is a prairie slough, having in it at one point a broad and shallow basin, where the water stands a greater portion of the year. In the month of June this presents. to the diatomist at least, a most remarkable appearance. In this basin, covering an extent of about an acre, and to the depth of eight or twelve inches, is a flocculent seal brown mass of living diatoms. Here *Fragillaria virescens* stretches its tiny ribbons, and *Meridion intermedium* spreads its miniature fans in numbers innumerable.

In the northern portion of the state, where the rivers are but little more than motionless lagoons, the amount of aquatic material is indeed prodigious. In such quantities do algæ,

lemnas, potomagetons, wolfia and diatoms grow, that the river is literally choked from bank to bank.

In the northeast corner of the state, however, the conditions are altogether different. The drainage system there is anything but poorly developed, it being a part of the state not known to have been glaciated. Many forms of diatoms are found here, not common to other localities in the state.

The Missouri river and its immediate tributaries offer but little that is interesting to the diatomist. But few species are found here, as the rapid currents and ever changing banks and beds of mud do not permit of their gaining a lodgment.

The second group of localities, the springs and bogs, offer us a flora at once more varied and robust. Here are found the larger naviculæ, with *Suriraya splendida*, *Campylodiscus spiralis*, *Stauroneis phoenecenteron* and a host of others, all with frustules strongly silicified. In a little bog, fed by a spring, some four miles from Iowa City, in a place but six feet square, the species *Campylodiscus spiralis*, a very large and pretty diatom, occurs in large numbers, its only known locality in the state, except, perhaps, one on the Des Moines river near High Bridge.

The third group of localities, the lakes in that portion of the state covered by Wisconsin drift, presents features of more than usual interest.

Clear Lake, located in Cerro Gordo county, is about six miles long by three wide. It belongs to the class of "kettle holes," and lies on the eastern edge of the Wisconsin drift, occupying the highest ground in that region. The town of Clear Lake has an altitude above sea level of 1,°38 feet, while at Mason City, nine miles east of there, the altitude is only 1,128 feet, or 110 feet lower. On the north, west, and south much the same conditions prevail.

This falling away in all directions brings about the following results:

First.—Very little surface drainage; the slope toward the lake being, in some places, only a few feet, while on the west it reaches its greatest length of about one mile.

Second.—There is no overflow, a state of equilibrium existing between rainfall and evaporation. Here, then, are the conditions necessary for the deposition of a bed of organic material. On examination the lake showed the following conditions:

The entire bottom, except a narrow strip along the shore

where the undertow keeps it clean, is covered with a bluish-black material, light of weight and very soft and yielding, commonly called mud. This is everywhere underlain by a heavy, tenacious, gravelly, blue clay. In the west end of the lake, at what is called the rice beds, where the water is only about two feet deep, the aforesaid mud reaches a depth of eighteen feet. Near the center of the lake are the "moss beds," with the water three feet deep and a deposit of twenty-one feet. About midway between the "moss beds" and the eastern shore the water reaches its maximum depth of fifteen feet, with the depth of the deposit undetermined.

On examination this deposited material proves to be 75 per cent organic matter, 12½ per cent fine sand and 12½ per cent diatom frustules. On an average this would give us a bed of diatoms two and one-half feet thick over an area of eight or ten square miles.

The number of species found in this material will number sixty, among them some of the largest and most beautiful fresh water forms known, such as *Suriraya robusta* and *biseriata*, *Navicula nobilis* and *peregrina*, *Cymatopleura solea* and *elliptica*. Here, too, are found *Nitzschia sigmoidea*, 400 to 500 micra long, with its 66,000 striæ to the inch, and *Nitzschia palea* with 91,440 striæ to the inch.

The species and individuals both decrease in numbers as one passes downward, *i. e.*, there are more diatoms growing there now than at any previous time. The increase in species has most likely been accomplished by waterfowl carrying hither bits of mud from other lakes.

One feature of the Clear Lake diatoms was very puzzling. What appeared to be *Pleurosigma attenuatum*, which usually has a length of 190 to 250 micra, was habitually 250 to 300 micra long. *Cymbella ehrenbergii* presented the same variation, as did likewise half a dozen other species. This variation toward larger forms came, finally, to be so common an occurrence that it was concluded that it perhaps was due to an extraordinary amount of silica in solution, and other very favorable conditions.

Spirit Lake is located in Dickinson county, Iowa, on the western part of the Wisconsin drift. It resembles Clear Lake in most essential points. The sand beach, however, is wider, and it is not so rich in microscopic forms. The deposit is not so great, but the water somewhat deeper.

East Okoboji Lake is composed of three small lakes in a chain, the water varying from three feet in the upper one to eighteen or twenty feet in the lower one. The deposit varies also from eight feet in the upper to a much greater depth in the lower. Here there is a much greater percentage of sand than in Clear Lake, due to more extended surface drainage and steeper hills.

The channel, however, which connects East Okiboji and West Okiboji Lakes, is the most remarkable place of all. Remarkable, not only for the number of diatoms, but for a host of other aquatic forms growing in the most lavish profusion. The conditions here are certainly very favorable for plant growth. High hills, covered with trees, protect the channel from the winds, and its form precludes the possibility of large waves. Then, too, a gentle current sets from one lake to the other, keeping the water in fine condition. In the fall, after the larger plants have passed their perfection and have begun to die, the diatoms overrun them all and, indeed, every other thing below the surface of the water. The common bladderwort becomes the home of vast colonies of the stalked forms, as cocconema, gonphonema, bands of fragillaria, with long, acicular synedra intermingled. Acres are thus covered, where there are no large waves and the water is not too deep. In those parts of the lake where rushes grow, each one is covered below the water line with a layer a half an inch or more in thickness.

Across this channel a railroad was built, and in so doing a diatomaceous deposit was found fifty-two feet deep

In West Okiboji Lake water was found 125 feet deep, the deposit being of unknown depth. So soft and yielding is this material that a dredge, weighing only two or three pounds, when dragged along the bottom sinks into it to a depth of ten or twelve feet.

In comparing the species found here with those found in Clear Lake, both lying in the same geological formation and no great distance apart, it is seen at a glance that they are utterly different. In Clear Lake such genera as suriraya, navicula, cymbella, eunotia pleurosigma and cymatopleura are found, as compared with cocconema, odontidium, stictodiscus and synedra in Okoboji Lake.

Silver Lake also adds a small quota, but has not been carefully examined.

The fourth division, that of fossil diatoms in Iowa, is reserved for another paper.

The number of counties in the state which have been visited by the author, and those from which material has been received, number twenty-nine.* At some future time we expect to present to the people of Iowa who are interested in this work, a descriptive list of all the species of diatoms found, with a photograph of each.

REPORT ON A FOSSIL DIATOMACEOUS DEPOSIT IN MUSCATINE COUNTY, IOWA

BY P. C. MYERS.

Previous to the present year no fossil diatoms had been found in Iowa. On October 20, 1898, Prof. J. A. Udden, of Rock Island, Ill., while engaged in work for the Iowa Geological survey, found and sent to Prof. S. Calvin, of the State University, some diatomaceous earth. This material was taken from below the loess in Muscatine county, Iowa, and was turned over to the author for examination. It was of a dull, yellow color, composed of sand and decayed vegetable matter and a few diatoms.

The species, with their general distribution and habitat, are as follows:

Navicula abaujenssis Paut. Fresh water fossil in Hungary.

Navicula borealis (Ehr.) Kuetz. In fresh water, cataracts, rivers and wet moss, all over Europe and America.

Navicula gibba (Ehr.) Kuetz. Everywhere in fresh water.

Navicula major Kuetz. A cosmopolitan species in fresh water.

Navicula nobilis (Ehr.) Kuetz., var. dactylus (Ehr.) V. H. In bogs and fossil.

Navicula rupestris (Pinn.) Hantz. On wet rocks.

Navicula placentula (Ehr.) Kuetz. In rivers in Europe and America; also fossil and marine.

---

*As there are many places in the state still unexplored, I desire at this time to say to the members of the Academy that I should be glad of their co-operation in this matter.